

Reusable Material Photocatalyst Based on Iron Sand Glagah Beach Kulonprogo Against Degradation of Methylene Blue Dye

by Rita Prasetyowati, Ariswan, Pinaka Elda Swastika, Fika Fauzi, Aura Novanti Utomo Putri, Evan Fajri Mulia Harahap, Runny Indo Saputri, Riska Arsita Sari, Ardhia Putri Wardani, Arina Fauza achsuniya

ABSTRACT

It is undeniable that the current rapid pace of industrial and technological development contributes to an increase in waste in the environment, one of which is color waste such as methylene blue (MB), methylene orange (MO), methylene red (MR), congo red and rhodamine blue. (Rh-B). Photodegradation or photocatalyst is one of the effective methods for treating water or wastewater. Therefore, it is necessary to conduct research on the most effective photocatalyst material used for this process. Graphene oxide (GO) is one of the materials that can be used in photocatalytic activity because it has a unique electronic band structure, has strong acceptors, conducts channels and produces electrons from the photodegradation process. In addition, the addition of magnetic material can facilitate magnetic separation in solution so as to allow the photocatalyst material to be reused for the next degradation process. Fe_3O_4 magnetic nanoparticles are one of the suitable candidate materials for photocatalysts because of their biocompatibility, easy availability, low cost and high saturation magnetization. This material can be synthesized from natural iron sand. This research will use iron sand from Glagah Beach, Kulon Progo. The potential for iron sand found on the Glagah coast is very large. But unfortunately, it has not been used optimally. The purpose of this study was to examine the use of $\text{Fe}_3\text{O}_4/\text{GO}$ nanocomposite to degrade MB color waste and how it performs after being carried out more than once. This research will be carried out for 1 year. The addition of GO can indeed increase photocatalyst activity rapidly. However, the addition of too much GO can make the magnetic properties of the $\text{Fe}_3\text{O}_4/\text{GO}$ composite not dominant. If this happens, it will be difficult to separate the photocatalyst material from the solution so that it cannot be reused. Therefore, optimization of $\text{Fe}_3\text{O}_4/\text{GO}$ composites is very important for the development of effective and reusable photocatalyst materials to improve environmental quality.

Kata Kunci: *Photocatalyst, Fe_3O_4 , graphene oxide, methylene blue, iron sand*